

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior versions, and listings, of claims in the application:

Claims 1-10 (Canceled)

11. (Currently Amended) A field effect transistor (FET) configured to sense a property of a medium, the FET comprising:

a source contact;

a drain contact;

a gate contact, wherein the gate contact defines a gate area disposed below and adjacent the gate contact; ~~and~~

a sensing layer for sensing the property, wherein the sensing layer is disposed below the gate contact and wherein the sensing layer is exposed to the medium in the gate area; and

a dielectric layer disposed between the gate contact and the sensing layer.

12. (Original) The FET of claim 11, wherein the gate contact includes at least one perforation.

13. (Canceled)

14. (Currently amended) The FET of claim ~~[43]~~ 11, wherein the dielectric layer includes at least one perforation in the gate area adjacent the gate contact.

Claims 15-20 (Canceled)

21. (New) The device of claim 11, wherein the sensing layer comprises gallium nitride (GaN).

22. (New) The device of claim 11, wherein the source and drain contacts are formed on the sensing layer.

23. (New) A semiconductor device configured to sense a property of a medium, the device comprising:

an electrical contact; and

a gallium nitride (GaN) sensing layer disposed below the contact, wherein the sensing layer is exposed to the medium in an area below the contact by at least one perforation in at least one of the contact and a second layer disposed between the sensing layer and the contact.

24. (New) The device of claim 23, wherein the contact includes the at least one perforation for exposing the sensing layer to the medium.

25. (New) The device of claim 24, wherein the at least one perforation comprises an area in the range from approximately one square nanometer to approximately ten square centimeters.

26. (New) The device of claim 23, further comprising at least one additional contact.

27. (New) The device of claim 23, wherein the device is configured to operate as a field effect transistor and wherein the contact comprises a gate contact.

28. (New) The device of claim 25, wherein the field effect transistor comprises a compound semiconductor field effect transistor.

29. (New) The device of claim 21, wherein the property comprises a pH level.

30. (New) The device of claim 23, further comprising the second layer disposed between the contact and the sensing layer.

31. (New) The device of claim 30, wherein the second layer includes the at least one perforation for exposing the sensing layer to the medium.

32. (New) The device of claim 23, wherein the sensing layer comprises a layer in an aluminum gallium nitride (AlGa_N)/gallium nitride (Ga_N) heterostructure.

33. (New) A semiconductor device configured to sense a property of a medium, the device comprising:

an electrical contact that includes at least one perforation to expose a sensing layer to the medium;

a dielectric layer disposed below the contact; and

a nitride active structure disposed below the dielectric layer, wherein the sensing layer comprises at least one of: the dielectric layer and a semiconductor layer in the active structure.

34. (New) The semiconductor device of claim 33, wherein the dielectric layer includes at least one perforation.

35. (New) The semiconductor device of claim 33, wherein the nitride active structure comprises an aluminum gallium nitride (AlGa_N)/gallium nitride (Ga_N) heterostructure.

36. (New) The semiconductor device of claim 33, wherein the device is configured to operate as a field effect transistor.

37. (New) The semiconductor device of claim 36, wherein the contact comprises a gate contact.